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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES

DURING THE CALENDAR YEAR 1922

BY

WILLIAM W. ADAMS

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CONTENTS.

	Page.
Introduction	1
Acknowledgments	1
Scope of statistics	2
Classification of accidents	3
Accidents at ore-dressing plants	3
Accidents at smelters	4
Accidents at auxiliary works	4
Metallurgical-plant accidents, 1919–1922	5
Accidents at copper mills and smelters	5
Accident rates based on hours of exposure	5
Comparison of accident rates for small plants and large plants	6
Statistical tables	6
Publications on accident statistics	31

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ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1922.

By WILLIAM W. ADAMS.

INTRODUCTION.

Accidents to men employed in the metallurgical industry [1] in the United States in 1922 resulted in the death of 45 men and in injury to 6,678 men, according to reports from operating companies to the Bureau of Mines of the Department of the Interior. The injuries include all that caused disability for more than one day. Based on a standard of 300 workdays to the year, the fatality rate for the year was 0.98 for each thousand men employed; the nonfatal-injury rate was 145.15. The rates for the previous year were 0.76 and 126.74, respectively.

The companies' reports showed that 44,000 men were employed during the year, an increase of 32 per cent over 1921; that the average working time per man was 314 days, an increase of 15 per cent; and that the total exposure to risk—that is, the amount of labor performed by all employees—was equivalent to 13,802,318 man-days, an increase of 56 per cent over the revised figure for 1921.

The figures for 1922 were classified into three main groups—(1) those for mills; (2) those for smelters; and (3) those for auxiliary works, such as yards, shops, and construction work. For the mills, the accident rates per thousand employees were 1.09 killed and 179.51 injured; for smelters, 0.77 killed and 143.71 injured; for auxiliary works, 1.21 killed and 120.26 injured.

Of the 6,723 accidents during the year, 0.67 per cent were fatal, 0.03 per cent resulted in permanent total disability, 1.13 per cent resulted in permanent partial disability, 24.17 per cent caused temporary disability of more than 14 days, and 74 per cent resulted in disability of more than one day but not more than 14 days.

Table 1 shows the number of men employed and the number of accidents in the metallurgical industry for each year since 1913, the first year for which figures are available.

ACKNOWLEDGMENTS.

The Bureau of Mines gratefully acknowledges the cooperation of owners and operators of metallurgical plants and of others inter-

[1] Iron blast furnaces excluded.

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ested in the metallurgical industry who have voluntarily furnished the data upon which the tables in this report are based.

Data for California were furnished by the industrial accident commission of that State. For assistance in the compilation of the various tables, credit is due Miss L. S. Gerry and Miss E. V. Walters, of the Bureau of Mines.

SCOPE OF STATISTICS.

The tables in this paper have been compiled by the Bureau of Mines from reports furnished voluntarily and directly by operators of ore-dressing plants and smelters, with the exception of the data for California. The data for California were furnished by the industrial accident commission of that State. The statistics represent the entire metallurgical industry, except iron blast-furnace plants, accident reports for those not being received by the Bureau of Mines. The figures for smelting plants cover copper, lead, gold, and silver smelters and refineries; those for ore-dressing plants represent concentrating plants for copper ores, lead ores, and zinc ores, stamp mills, cyanide plants, iron-ore washers, flotation mills, and sampling works.

TABLE 1.—*Summary of labor and accidents at metallurgical plants.*

	Men employed.		Days of labor performed.	Average days active.	Total number killed.	Number killed per 1,000 300-day workers.	Total number injured.	Number injured per 1,000 300-day workers.
	Actual number.	300-day workers.						
Ore-dressing plants:								
1913	14,985	16,154	4,846,338	323	16	0.99	1,977	122.38
1914	15,128	15,225	4,567,529	302	23	1.51	1,434	94.19
1915	18,564	19,107	5,732,184	309	30	1.57	2,095	109.65
1916[1]	22,365	23,470	7,041,083	315	33	1.41	3,184	135.66
1917[1]	24,111	24,372	7,311,499	303	47	1.93	2,952	121.12
1918[1]	21,809	22,517	6,754,962	310	35	1.55	3,142	139.54
1919[1]	17,262	16,862	5,058,545	293	25	1.48	2,057	122.21
1920[1]	16,827	16,813	5,043,911	300	21	1.25	2,624	156.07
1921[1]	10,047	8,037	2,411,148	240	4	.50	1,214	151.05
1922[1]	11,676	11,052	3,315,471	284	12	1.09	1,984	179.51
Smelting plants:[2]								
1913	20,764	21,309	7,292,766	355	47	1.93	4,217	174.71
1914	27,879	32,336	9,700,769	348	33	1.02	5,673	175.44
1915	31,327	36,262	10,878,486	347	38	1.05	5,718	157.69
1916[1]	43,829	49,363	14,809,046	338	36	.73	9,656	195.61
1917[1]	44,376	50,659	15,197,643	342	53	1.05	7,715	152.88
1918[1]	39,899	45,439	13,631,601	342	42	.92	6,743	148.40
1919[1]	28,777	31,324	9,397,082	327	34	1.09	4,431	141.46
1920[1]	26,099	30,411	9,123,186	350	20	.66	4,147	136.37
1921[1]	14,621	14,204	4,261,304	293	14	.99	2,129	149.89
1922[1]	19,495	20,887	6,266,159	321	16	.77	3,002	143.71
Auxiliary works:								
1913, 1914, 1915[3]								
1916	14,067	15,763	4,729,010	338	14	.89	2,240	142.10
1917	15,555	17,014	5,104,146	328	16	.94	2,881	169.33
1918	18,044	20,111	6,033,184	334	17	.85	2,808	139.63
1919	15,081	16,172	4,851,726	322	5	.31	1,638	101.29
1920	16,306	18,363	5,508,756	338	20	1.08	2,092	113.92
1921	8,762	8,308	2,492,519	284	9	1.08	1,151	138.54
1922	12,829	14,069	4,220,688	329	17	1.21	1,692	120.26

[1] Not including auxiliary works, as shops, yards, etc.
[2] Exclusive of iron blast furnaces.
[3] Not separately reported.

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CLASSIFICATION OF ACCIDENTS.

As a step in the attainment of uniformity in the statistical presentation of the hazards of the metallurgical and mining industries, the Bureau of Mines in 1916 classified the nonfatal injuries on a 14-day (2 weeks) basis, thus conforming with the classification adopted in the compensation laws of many States. A summary of accidents at mills, smelters, and auxiliary works on this basis for 1916 to 1922 follows:

Fatal and nonfatal accidents, 1916–1922.

	1916	1917	1918	1919	1920	1921	1922
1. Fatal	83	116	94	64	61	27	45
2. Serious (time lost, more than 14 days): Permanent disability—							
Total [1]	17	5	7	2	2	0	2
Partial [2]	200	202	247	71	147	38	76
Others	3,443	3,302	3,028	[3] 1,869	[3] 1,990	[3] 1,025	1,625
3. Slight (time lost, 1 to 14 days, inclusive)	11,420	10,069	9,411	6,184	6,724	3,431	4,975
Total nonfatal injuries	15,080	13,578	12,693	8,126	8,863	4,494	6,678
Grand total (fatal and nonfatal)	15,163	13,694	12,787	8,190	8,924	4,521	6,723
Men employed	80,201	84,042	79,752	61,120	59,232	37,465	44,000

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability; and in 1922, 83 cases of permanent partial disability and 2 cases of permanent total disability.

ACCIDENTS AT ORE-DRESSING PLANTS.

During the year covered by this report, accidents at ore-dressing plants resulted in the death of 12 men and in the injury of 1,984 men, each injury causing disability for more than the remainder of the shift. The total number of men employed during the year was 11,676; their average working time was 284 days, and the total days, or shifts, worked 3,315,471. This number of shifts represents the amount of work that could be done by 11,052 men working a standard year of 300 full workdays. On this basis the fatality rate was 1.09 per thousand employees, as compared with an average rate of 1.49 for the five previous years (1917–1921). The nonfatal injury rate was 179.51, as compared with a five-year average rate of 135.32.

The main causes of nonfatal accidents at ore-dressing plants were machinery, falling objects, falls of persons, hand tools, flying pieces of rock from sledging or crushing, haulage, and nails and splinters. Other enumerated causes resulted in less than 100 injuries each. Of the 12 fatalities during the year, 5 were caused by machinery, 2 by suffocation in ore bins, and 1 each by tables and jigs, fall of person, cyanide or other poisoning, scalding by steam or water, and electricity.

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The severity of the accidents is indicated by the figures which show that 12 were fatal, 1 resulted in permanent total disability, 21 caused permanent partial disability, 404 resulted in temporary disability lasting more than 14 days, and 1,558 resulted in disability from 1 to 14 days.

ACCIDENTS AT SMELTERS.

Accidents to men working at smelters in 1922 resulted in 16 deaths and 3,002 injuries. The number of employees at smelters was 19,495; they worked 6,266,159 shifts, an average of 321 days per man. The number of shifts worked represents the equivalent of 20,887 men working 300 days each. For every thousand full-time workers, the fatality rate was 0.77, as compared with an average rate of 0.95 for the five years 1917–1921; the injury rate was 143.73, as against an average of 146.45.

Most of the nonfatal injuries at smelters were caused by burns from matte, slag, or molten metal; by flying or falling objects; by hand tools; by falls of persons; by haulage accidents; and by machinery. Less than 100 injuries were due to each of the other enumerated causes of accidents. Of the fatal accidents, the outstanding causes were falls of persons, haulage, and burns from matte, slag, or molten metal.

Of the 3,018 accidents at smelters during the year, 16 were fatal, 1 resulted in permanent total disability, 42 caused permanent partial disability, 804 caused temporary disability for more than 14 days, and 2,155 resulted in disability lasting from 1 to 14 days.

ACCIDENTS AT AUXILIARY WORKS.

Seventeen men were killed and 1,692 were injured by accidents in 1922 at auxiliary works operated in connection with mills and smelters. Men employed at these plants numbered 12,829; they averaged 329 workdays per man and worked a total of 4,220,688 shifts. The number of shifts represents the amount of work that could have been done in 300 days by 14,069 men. The fatality rate per 1,000 full-time workers was 1.21, as compared with an average rate of 0.84 for the five years 1917–1921; the nonfatal injury rate was 120.26, as against a five-year average of 132.20.

The principal causes of nonfatal accidents at auxiliary plants were falling objects, falls of persons, hand tools, and machinery. Of the fatalities, the main causes were haulage, failure of ladders or scaffolds, and electricity.

Of the 1,709 accidents during the year, 17 were fatal, 13 caused permanent partial disability, 417 caused temporary disability for more than 14 days, and 1,262 resulted in disability of 1 to 14 days.

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METALLURGICAL-PLANT ACCIDENTS 1919–1922.

Table 16 shows the causes and the degree of severity of accidents at metallurgical plants during the four-year period 1919-1922. During this period the average annual number of employees at mills was 13,953, at smelters 22,248, and at auxiliary plants 13,245. The total exposure to hazard at mills was equivalent to 15,829,075 man-days; at smelters 29,047,731 days; and at auxiliary plants 17,073,699 days. The accident rates, including both fatal and nonfatal injuries, were 151 for mills, 142 for smelters, and 116 for auxiliary plants per thousand 300-day workers.

ACCIDENTS AT COPPER MILLS AND SMELTERS.

Mills and smelters treating copper ores constitute an important part of the metallurgical industry of the United States and one that is readily segregated.

Table 15 is based upon the reports of 42 copper mills employing 3,888 men in 1922 and 26 copper smelters employing 7,163. Fatal and nonfatal injuries at mills resulted in an accident rate of 173 per thousand 300-day workers, as compared with an average 4-year rate of 154 for the period 1918–1921. The rate for copper smelters was 130, as against a 4-year average of 158. The rate for mills in 1921 was 173 and that for smelters was 138.

ACCIDENT RATES BASED ON HOURS OF EXPOSURE.

The ratio of accident occurrence to the amount of exposure to risk constitutes the index to accident frequency and accident severity. Without a knowledge of this index persons seeking to prevent accidents are necessarily handicapped. To learn the index, a complete record of every accident and a large amount of statistical work are required; but the present cost of industrial accidents, whether estimated on a financial or a humanitarian basis, amply justifies any effort to obtain information needed to promote safety in industry.

To learn the amount of "exposure to hazard" in the metallurgical industry, the bureau's accident questionnaires for 1922 requested operators to give the number of hours that constituted a working shift. With this information from each company, the total hours worked by all employees could easily be calculated. From the operators' returns for 1922 Tables 19 and 20 have been compiled to show the frequency of accidents of varying degrees of severity among men working 8 hours, 9 hours, and 10 hours a day. No rates are shown for 11-hour and 12-hour men, because less than 500 men were employed in each of these groups.

Figures covering accidents at mills, as presented in Table 20, show the lowest frequency and severity rates for men employed 9 hours a day, the frequency rate for all accidents being 39 per million

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hours of exposure to hazard. The 8-hour men showed 54 accidents per million hours, while men working 10 hours a day showed an accident-frequency rate of 115 accidents per million hours. The severity rates also were in all cases lower for the 8-hour men than for the 10-hour men.

The figures for smelters, also shown in Table 20, relate only to 8-hour and 9-hour men, because of the small number of men employed in the other groups. The accident-frequency rate for the 8-hour men was 63 per million hours of exposure, as compared with 101 for the 9-hour men. For each class of accidents according to severity of injury, the rate was also lower for the 8-hour men except as regards permanent total disabilities, for which the rate of 0.03 was shown for the 8-hour men and none for the 9-hour men.

As the foregoing figures relate only to 1922, they can not be considered as conclusive until they are confirmed by data covering a longer period. They are the only evidence available at present, however, of the influence of the length of shift upon the accident hazard to which men employed at mills and smelters are exposed. Comparable data for 1923 will be included in the next annual publication on accidents in the metallurgical industry.

COMPARISON OF ACCIDENT RATES FOR SMALL PLANTS AND LARGE PLANTS.

The resources back of an industrial enterprise necessarily determine the expenditures that may be made for accident-prevention work and for other purposes. To the extent that the number of men employed indicates a plant's resources and equipment for safety work, figures based on the operators' reports for 1922 and presented in Table 21 show that mills and smelters employing 200 or more men each, suffered fewer accidents for any given number of employees than did smaller plants, those employing less than 200 men each. Accidents were most frequent where only 1 to 25 men were employed. Mills employing 300 or more men each had an accident rate lower than that for any other group; next in order were mills employing 50 to 99 men; the third lowest rate was for mills employing 200 to 299 men each. For smelters the lowest accident-frequency rate was at plants employing 200 to 299 men, and the second lowest rate at plants employing 300 or more men.

Although the figures relate only to a single year, and hence their significance is somewhat limited, they seem to indicate that the larger plants enjoy an advantage over the smaller ones in overcoming the accident hazards to which workers in metallurgical industries are exposed.

STATISTICAL TABLES.

The following tables show the classification and the number of accidents at metallurgical works in the United States during the calendar year 1922:

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TABLE 2.—*Number of men employed, number of days worked, and number of men killed and injured at metallurgical plants in the United States during the year ended December 31, 1922.*

State.	Ore-dressing plants.					Smelting plants.					Auxiliary works.					Widows.	Orphans.
	Men employed.	Shifts.	Average days active.	Killed.	Injured.	Men employed.	Shifts.	Average days active.	Killed.	Injured.	Men employed.	Shifts.	Average days active.	Killed.	Injured.		
Alabama	48	8,190	171	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alaska[2]	269	93,509	348	.....	26	.....	.....	.....	.....	.....	194	70,422	363	1	34	.....	.....
Arizona	1,052	337,363	321	1	244	1,755	480,757	274	1	351	1,534	477,892	312	.....	141	1	1
Arkansas	(1)	.....	.....	.....	.....	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
California[3]	428	138,687	324	.....	66	361	114,399	317	.....	44	321	108,565	338	.....	7	.....	.....
Colorado	642	188,418	293	1	61	784	239,456	305	1	74	306	86,528	283	.....	7	2	1
Idaho	419	108,151	258	.....	37	(1)	.....	.....	.....	.....	209	73,392	351	.....	5	.....	.....
Illinois	86	20,493	238	.....	11	1,311	447,263	341	2	171	696	228,040	328	.....	98	2	11
Kansas	257	65,770	256	.....	90	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Michigan	983	251,585	259	.....	52	496	127,618	257	1	103	201	52,837	263	.....	55	1	.....
Minnesota	214	50,530	207	.....	52	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Missouri	578	174,735	302	.....	76	(1)	.....	.....	.....	.....	597	202,393	339	.....	118	.....	.....
Montana	1,043	338,866	325	3	84	1,382	480,392	348	3	97	1,984	686,174	346	8	212	7	9
Nevada	673	187,738	279	4	134	415	100,525	242	1	74	136	32,817	141	3	79	4	6
New Jersey	428	124,251	290	.....	33	2,192	762,080	348	4	263	1,120	388,052	346	.....	126	4	15
New Mexico	367	89,531	244	.....	21	(1)	.....	.....	.....	.....	231	64,238	278	2	145	2	4
New York	864	227,237	263	.....	69	(1)	.....	.....	.....	.....	1,014	314,488	310	2	163	.....	.....
Oklahoma	663	176,940	267	1	291	1,459	408,810	280	1	218	190	55,156	290	.....	37	1	.....
Oregon	(1)	.....	.....	.....	.....	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	(1)	.....	.....	.....	.....	2,157	777,465	360	.....	480	1,284	467,036	364	1	115	1	.....
South Dakota	229	82,791	362	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	172	38,188	222	.....	21	(1)	.....	.....	.....	.....	688	241,572	351	.....	160	.....	.....
Texas	125	39,315	315	.....	12	452	161,169	364	.....	36	.....	.....	.....	.....	.....	.....	.....
Utah[4]	814	223,104	275	2	315	1,714	584,510	341	.....	171	888	249,514	281	.....	39	.....	.....
Vermont	79	22,800	289	.....	58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Virginia	(1)	.....	.....	.....	.....	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington	63	21,099	335	.....	5	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	(1)	.....	.....	.....	.....	535	195,275	365	1	123	391	142,715	365	.....	36	.....	.....
Wisconsin	59	17,755	301	.....	7	(1)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Other States	1,091	284,922	261	.....	189	4,482	1,383,140	309	1	797	845	278,857	330	.....	115	.....	.....
Total, 1922	**11,676**	**3,315,471**	**284**	**12**	**1,984**	**19,495**	**6,266,159**	**321**	**16**	**3,002**	**12,829**	**4,220,688**	**329**	**17**	**1,692**	**25**	**47**
Total, 1921	10,047	2,411,148	240	4	1,214	14,621	4,261,304	307	14	2,129	8,762	2,492,519	284	9	1,151	15	28

[1] Included in "Other States."
[2] Stamp mills, other than at lode mines, not included.
[3] Figures relating to California, in this and all other tables, were supplied by the Industrial Accident Commission of the State of California, San Francisco, Calif.
[4] Figures relating to Utah, in this and all other tables, were supplied by the Industrial Accident Commission, Salt Lake City, Utah.

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TABLE 3.—***Metallurgical plants:*** *Fatalities, by causes and*

State.	Ore-dressing plants.[1]															
	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Crushers, rolls, or stamps.	Tables, jigs, etc.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Falling objects (rocks, timbers, etc.).	Cyanide or other poisoning.	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing.	Other causes.	Total.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Arizona	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
Colorado	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
Illinois	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Montana	....	....	....	....	1	....	2	....	....	....	....	....	....	....	....	3
Nevada	....	....	....	1	1	1	....	....	1	....	....	....	....	....	....	4
New Jersey	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New Mexico	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
New York	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oklahoma	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
Pennsylvania	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Utah	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
West Virginia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Other States	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total, 1922	....	....	....	1	5	1	2	....	1	1	1	....	....	....	....	12
Total, 1921	1	....	1	....	2	....	....	....	....	....	....	....	....	....	....	4

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

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States, during the year ended December 31, 1922.

Smelting plants.[2]															Auxiliary works.[3]										
Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Cranes.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Flying or falling objects (rocks, timber, etc.).	Gas (burns or asphyxiation).	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling).	Hot-metal explosion.	Other causes.	Total.	Haulage system, (cars, motors, etc.).	Railway cars and locomotives.	Falls of persons.	Falling objects (rocks, timbers, etc.).	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Failure of ladder, scaffold, or other support.	Handling hot materials.	Other causes.	Total.
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
												1			1									1			1
									1						1												
				1				1						1	2												
1				1		1									3	3		1				2			2		8
	1			1			1					1			4				1					2			3
																1									1		2
			1												1	1							1				2
																								1			1
1				1											1												
2	1		1	5		1	1	1	1			2		1	16	4		1	1			3	1	4	1	2	17
2			2	2	2	1		1				1		3	14	1	2	1					1			4	9

[1] Blast, reverberatory, and roasting furnaces, converters, casting department and refineries.
[2] Yards, shops, construction, etc.

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TABLE 4.—***Metallurgical plants:*** *Injuries, by causes and*

State.	Ore-dressing plants.[1]															
	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Crushers, rolls, or stamps.	Tables, jigs, etc.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Falling objects (rocks, timbers, etc.).	Cyanide or other poisoning.	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Flying pieces of rock from sledging or crushing.	Other causes.	Total.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Alabama	2															2
Alaska	3		2	1	5			4				2	1			28
Arizona	7	11	4	5	32	29	4	20			2	32	21	5	72	244
Arkansas																
California	3		6		7	11		9			1	4	5	4	10	60
Colorado	4	2	5	1	8	6		1		1	1	2	1	3	26	61
Idaho	2	1	2	1	3	6		2	1		2	3	4	2	8	37
Illinois	2		2	2				1		1		1		1	1	11
Kansas			5	10	4	5		3				1	2	33	27	90
Michigan	2	1	1		6	9		6				6	2	1	18	52
Minnesota	4	5			1	4		12		3	1	2	1	4	15	52
Missouri	5	1	5	5	4	8		12		1	1	6	6	7	15	76
Montana	7	2	3	1	16	6		7			3	3	1		33	84
Nevada	7		3		16	28		27	2		3	18	2	1	27	134
New Jersey		1	1		3	3		1		2	1	5	3		13	33
New Mexico	1			3	2	3		2		1	2	2			5	21
New York	3	3	3		13	3		13		1		6	2	3	19	69
Oklahoma	2		21	23	27	19		24			2	22	19	51	81	291
Pennsylvania																
South Dakota			4		2	2		1				3			16	28
Tennessee		2			5	3		2			1	4			6	21
Texas						1									11	12
Utah	45	21	19	6	30	31		35	1	12	13	28	28	16	27	315
Vermont	3		1		3	8		3				1		18	21	58
Washington			1									1	1	1	1	5
West Virginia																
Wisconsin						1		2				3	1			7
Other States	14	4	2	5	36	8	1	29		5	4	12	5	13	51	189
Total, 1922	116	54	90	63	223	197	5	216	4	27	37	167	105	163	517	1,984
Total, 1921	53	17	70	17	130	132	5	99	4	22	24	108	64	73	396	1,214

[1] Stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.
[2] Blast, reverberatory, and roasting furnaces, converters, casting department, and refineries.
[3] Yards, shops, construction, etc.

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States, during the year ended December 31, 1922.

Smelting plants.[2]																Auxiliary works.[3]												
Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Cranes.	Other machinery.	Falls of persons.	Suffocation in ore bins.	Flying or falling objects (rocks, timber, etc.).	Gas (burns or asphyxiation).	Scalding (steam or water).	Electricity.	Hand tools, axes, bars, etc.	Nails, splinters, etc.	Burns from matte, slag, or molten metal (pouring or spilling).	Hot-metal explosion.	Other causes.	Total.	Haulage system (cars, motors, etc.).	Railway cars and locomotives.	Falls of persons.	Falling objects (rocks, timbers, etc.).	Nails, splinters, etc.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Failure of ladder, scaffold, or other support.	Handling hot materials.	Other causes.	Total.
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		31	32	33	34	35	36	37	38	39	40	41	
																2		6	9	1	2		3			11	34
30	8	6	19	37	1	53			5	37		54	15	86	351	3	10	18	21	11	22	1	17	10	6	22	141
14			3	7		8	1			1		2	2	6	44	1		1	1		1					3	7
11	1		10	7		9	2	1	1	11	2	6	2	11	74			1	1		1	1	1			2	7
																			3		1					1	5
15	1	2	6	8		37				9	3	54	6	30	171	11	1	13	14	5	11		9		2	32	98
4			2	11		2				17	5	3		59	103			6		3			6		1	39	55
14		6	1	11		22		1		4	3	9	2	24	97	5	1	5	33	7	10	2	16	2	11	26	118
1			2	6		18		1		14	5	5		15	74	6	4	15	22	10	19	4	37	2	3	90	212
17	9	5	17	20		52	5	3		26	6	50	4	49	263	1		17	15	5	10	2	5	1	6	17	79
																13		17	29	6	4	1	9	2	6	39	126
																1		9	8	3	22	4	7	2	5	84	145
4	5		9	13	1	35	4	1	1	12	2	83	4	44	218	11		17	51	4	11	3	13		9	41	163
10	1		12	25		32	9	6	1	42	3	54	2	283	480	6	1	5	8	4	3		3			7	37
																3	1	11	6	9	6		3		5	71	115
5	1			3		5	1	1		6		4	1	9	36												
15	16	7	9	20		8	4	5	5	19	10	29	9	15	171	7	6	26	35	11	23		6	2	4	40	160
																4	5	6	7	1	6	1		1		8	39
5			1	1		7	1			4	1	68	1	34	123	2			10		4		4			16	36
61	4	14	30	58		171	11	1		61	16	147	14	209	797	4		8	11	7	10	1	13		6	55	115
206	53	40	121	227	2	459	38	20	13	263	56	568	62	874	3,002	80	29	181	284	87	169	20	152	22	64	604	1,692
121	28	32	96	146		287	15	20	6	179	51	401	55	692	2,129	44	31	125	174	70	140	13	90	10	33	418	1,151

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TABLE 5.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, during the year ended December 31, 1922.*

Cause of accident.	Killed.			Injured.		
	Number killed.	Per cent of group total.	Per cent of grand total.	Number injured.	Per cent of group total.	Per cent of grand total.
Ore-dressing plants:						
1. Haulage system (cars, motors, etc.)	.....	.....	.....	116	5.85	1.74
2. Railway cars and locomotives	.....	.....	.....	54	2.72	.81
3. Crushers, rolls, or stamps	.....	.....	.....	90	4.54	1.35
4. Tables, jigs, etc	1	8.33	2.22	63	3.17	.94
5. Other machinery	5	41.67	11.11	223	11.24	3.34
6. Falls of persons	1	8.33	2.22	197	9.93	2.95
7. Suffocation in ore bins	2	16.67	4.44	5	.25	.07
8. Falling objects (rocks, timbers, etc.)	.....	.....	.....	216	10.89	3.24
9. Cyanide or other poisoning	1	8.33	2.22	4	.20	.06
10. Scalding (steam or water)	1	8.33	2.22	27	1.36	.40
11. Electricity	1	8.33	2.22	37	1.86	.56
12. Hands tools, axes, bars, etc	.....	.....	.....	167	8.42	2.50
13. Nails, splinters, etc	.....	.....	.....	105	5.29	1.57
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	163	8.22	2.44
15. Other causes	.....	.....	.....	517	26.06	7.74
Total	**12**	**100.00**	**26.67**	**1,984**	**100.00**	**29.71**
Smelting plants:						
16. Haulage system (cars, motors, etc.)	2	12.50	4.44	206	6.86	3.08
17. Railway cars and locomotives	1	6.25	2.22	53	1.76	.79
18. Cranes	.....	.....	.....	40	1.33	.60
19. Other machinery	1	6.25	2.22	121	4.03	1.81
20. Falls of persons	5	31.25	11.11	227	7.56	3.40
21. Suffocation in ore bins	.....	.....	.....	2	.07	.03
22. Flying or falling objects (rocks, timbers, etc.)	1	6.25	2.22	459	15.29	6.87
23. Gas (burns or asphyxiation)	1	6.25	2.22	38	1.27	.57
24. Scalding (steam or water)	1	6.25	2.22	20	.67	.30
25. Electricity	1	6.25	2.22	13	.43	.19
26. Hand tools, axes, bars, etc	.....	.....	.....	263	8.76	3.94
27. Nails, splinters, etc	.....	.....	.....	56	1.87	.84
28. Burns from matte, slag, or molten metal (pouring or spilling)	2	12.50	4.44	568	18.92	8.51
29. Hot-metal explosions	.....	.....	.....	62	2.07	.93
30. Other causes	1	6.25	2.22	874	29.11	13.09
Total	**16**	**100.00**	**35.55**	**3,002**	**100.00**	**44.95**
Auxiliary works:						
31. Haulage system (cars, motors, etc.)	4	23.53	8.89	80	4.73	1.20
32. Railway cars and locomotives	.....	.....	.....	29	1.71	.43
33. Falls of persons	1	5.88	2.22	181	10.70	2.71
34. Falling objects (rocks, timbers, etc.)	1	5.88	2.22	284	16.79	4.25
35. Nails, splinters, etc	.....	.....	.....	87	5.14	1.30
36. Hand tools, axes, bars, etc	.....	.....	.....	169	9.99	2.53
37. Electricity	3	17.65	6.67	20	1.18	.30
38. Machinery	1	5.88	2.22	152	8.98	2.28
39. Failure of ladder, scaffold, or other support	4	23.53	8.89	22	1.30	.33
40. Handling hot materials	1	5.88	2.22	64	3.78	.96
41. Other causes	2	11.77	4.44	604	35.70	9.05
Total	**17**	**100.00**	**37.78**	**1,692**	**100.00**	**25.34**
Grand total	**45**	.....	**100.00**	**6,657**	.....	**100.00**

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TABLE 6.—***Metallurgical plants:*** *Accidents during the year ended December 31, 1922.*

States.	Ore-dressing plants.[1]					Smelting plants.[2]					Auxiliary works.				
	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)
		Permanent total disability.[3]	Permanent partial disability.[4]	Others.[5]			Permanent total disability.[3]	Permanent partial disability.[4]	Others.[5]			Permanent total disability.[3]	Permanent partial disability.[4]	Others.[5]	
Alabama					2										
Alaska				5	21						1			4	30
Arizona	1		2	42	200	1		23	106	222			7	43	91
Arkansas															
California				27	39				23	21				1	6
Colorado	1		3	19	39	1		1	22	51				3	4
Idaho				15	22									3	2
Illinois				5	6	2			58	113			1	24	73
Kansas			1	17	72										
Michigan				21	31	1			37	66				5	50
Minnesota			2	11	39										
Missouri				9	67									20	98
Montana	3			18	66	3			34	63	8			51	161
Nevada	4			43	91	1			13	61	3			24	55
New Jersey				3	30	4			113	150				36	90
New Mexico				11	10						2			28	117
New York				16	53						2		3	59	101
Oklahoma	1	1	5	36	249	1			52	166				4	33
Oregon															
Pennsylvania							1	2	87	390	1		1	27	87
South Dakota				5	23										
Tennessee				3	18									30	130
Texas			1	3	8				12	24					
Utah	2		7	56	252			5	67	99			1	18	20
Vermont				6	52										
Virginia															
Washington				2	3										
West Virginia						1		1	14	108				3	33
Wisconsin				2	5										
Other States				29	160	1		10	166	621				34	81
Total, 1922	12	1	21	404	1,558	16	1	42	804	2,155	17		13	417	1,262
Total, 1921	4		12	281	921	14		18	510	1,601	9		8	234	909

[1] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[2] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department, and refineries.

[3] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[4] Permanent partial disability: Loss of one foot, hand, leg, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[5] "Other serious accidents" in 1919 include 50 cases of permanent partial disability; in 1920, 72 cases of permanent partial disability and 1 case of permanent total disability; in 1921, 18 cases of permanent partial disability and 2 cases of permanent total disability; and in 1922, 83 cases of permanent partial disability and 2 cases of permanent total disability.

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TABLE 7.—***Metallurgical plants:*** *Accidents during the year ended December 31, 1922.*

	Killed.	Seriously injured. (Time lost, more than 14 days.)			Slightly injured. (Time lost, 1 to 14 days.)
		Permanent total disability.[1]	Permanent partial disability.[2]	Others.	
Ore-dressing plants:[3]					
1. Haulage system (cars and motors, etc.)	.....	.....	1	36	79
2. Railway cars and locomotives	.....	.....	1	7	46
3. Crushers, rolls, or stamps	.....	.....	3	26	61
4. Tables, jigs, etc	1	.....	.....	13	50
5. Other machinery	5	.....	8	52	163
6. Falls of persons	1	.....	1	56	140
7. Suffocation in ore bins	2	.....	.....	.....	5
8. Falling objects (rocks, timbers, etc.)	.....	1	1	48	166
9. Cyanide or other poisoning	1	.....	.....	1	3
10. Scalding (steam or water)	1	.....	.....	7	20
11. Electricity	1	.....	.....	5	32
12. Hand tools, axes, bars, etc	.....	.....	1	25	141
13. Nails, splinters, etc	.....	.....	.....	13	92
14. Flying pieces of rock from sledging or crushing	.....	.....	3	17	143
15. Other causes	.....	.....	2	98	417
Total	**12**	**1**	**21**	**404**	**1,658**
Smelting plants:[4]					
16. Haulage system (cars, motors, etc.)	2	.....	5	84	117
17. Railway cars and locomotives	1	.....	1	28	24
18. Cranes	.....	.....	3	15	22
19. Other machinery	1	.....	7	38	76
20. Falls of persons	5	.....	1	85	141
21. Suffocation in ore bins	.....	.....	.....	1	1
22. Flying or falling objects (rocks, timbers, etc.)	1	.....	3	119	337
23. Gas (burns or asphyxiation)	1	.....	.....	14	24
24. Scalding (steam or water)	1	.....	.....	9	11
25. Electricity	1	.....	2	4	7
26. Hand tools, axes, bars, etc	.....	1	2	51	209
27. Nails, splinters, etc	.....	.....	1	11	44
28. Burns from matte, slag, or molten metal (pouring or spilling)	2	.....	11	149	408
29. Hot-metal explosions	.....	.....	2	23	37
30. Other causes	1	.....	4	173	697
Total	**16**	**1**	**42**	**804**	**2,155**
Auxiliary works:					
31. Haulage system (cars and motors, etc.)	4	.....	1	25	54
32. Railway cars and locomotives	.....	.....	.....	14	15
33. Falls of persons	1	.....	2	67	112
34. Falling objects (rocks, timbers, etc.)	1	.....	.....	76	208
35. Nails and splinters, etc	.....	.....	2	11	74
36. Hand tools, axes, bars, etc	.....	.....	2	41	126
37. Electricity	3	.....	1	6	13
38. Machinery	1	.....	1	51	100
39. Failure of ladder, scaffold, or other support	4	.....	2	6	14
40. Handling hot materials	1	.....	.....	16	48
41. Other causes	2	.....	2	104	498
Total	**17**	.....	**13**	**417**	**1,262**
Grand total	**45**	**2**	**76**	**1,625**	**4,975**

Number of wives left widows, 25.
Number of children under 16 years of age left fatherless, 47.

[1] Permanent total disability: Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Ore-dressing plants include stamp mills, sampling works, slime plants, lixiviation, leaching, cyanide, and flotation mills.

[4] Smelters include blast, reverberatory, and roasting furnaces; converters; casting department; and refineries. (Iron blast furnaces not included.)

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TABLE 8.—***Ore-dressing plants:*** *Fatalities and injuries, by causes and States, 1917 to 1922.*

	Killed.							Injured.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
ACCIDENTS BY CAUSES.														
1. Haulage system (cars, motors, etc.)	7	4	....	1	1	13	....	135	107	111	127	53	533	116
2. Railway cars and locomotives	4	1	2	....	....	7	....	29	68	48	24	17	186	54
3. Crushers, rolls, or stamps	3	....	1	2	1	7	....	112	111	108	102	70	503	90
4. Tables, jigs, etc	2	....	1	....	....	3	1	61	92	59	42	17	271	63
5. Other machinery	9	14	6	8	2	39	5	282	368	284	288	130	1,352	223
6. Falls of persons	9	6	4	2	....	21	1	399	414	201	323	132	1,469	197
7. Suffocation in ore bins	3	2	4	4	....	13	2	6	11	5	4	5	31	5
8. Falling objects (rocks, timbers, etc.)	4	....	1	....	....	5	....	371	389	200	283	99	1,342	216
9. Cyanide or other poisoning	....	1	1	....	....	2	1	24	45	11	16	4	100	4
10. Scalding (steam or water)	1	....	1	....	....	2	1	18	15	34	22	22	111	27
11. Electricity	4	3	2	2	....	11	1	40	63	23	36	24	186	37
12. Hand tools, axes, bars, etc	....	....	....	....	....	....	....	249	298	167	261	108	1,083	167
13. Nails, splinters, etc	....	....	....	....	....	....	....	193	165	97	120	64	639	105
14. Flying pieces of rock from sledging or crushing	....	....	....	....	....	....	....	302	198	140	179	73	892	163
15. Other causes	1	4	2	2	....	9	....	731	798	569	797	396	3,291	517
Total	**47**	**35**	**25**	**21**	**4**	**132**	**12**	**2,952**	**3,142**	**2,057**	**2,624**	**1,214**	**11,989**	**1,984**
ACCIDENTS BY STATES.														
Alabama	1	....	1	1	....	3	....	7	25	12	9	....	53	2
Alaska	3	....	3	1	1	8	....	141	54	25	49	12	281	26
Arizona	6	6	2	1	....	15	1	578	653	448	314	93	2,086	244
California	....	3	1	3	....	7	....	30	105	43	114	66	358	66
Colorado	7	2	2	3	....	14	1	214	170	64	120	79	647	61
Idaho	....	....	....	1	1	2	....	62	62	27	51	26	228	37
Illinois	....	....	....	1	....	1	....	9	26	24	16	5	80	11
Kansas	....	....	....	....	1	1	....	15	31	22	42	61	171	90
Michigan	2	2	2	1	....	7	....	88	88	102	144	43	465	52
Minnesota	....	....	1	....	....	1	....	40	18	34	19	27	138	52
Missouri	2	1	....	2	....	5	....	175	219	152	130	92	768	76
Montana	6	4	....	1	....	11	3	148	168	82	104	38	540	84
Nevada	4	6	4	2	....	16	4	117	142	51	181	85	576	134
New Jersey	2	....	1	....	....	3	....	57	60	40	26	27	210	33
New Mexico	1	1	1	2	....	5	....	183	229	115	79	9	615	21
New York	1	2	3	....	....	6	....	77	56	206	158	113	610	69
Oklahoma	2	1	3	....	....	6	1	208	212	213	335	80	1,048	291
Oregon	....	1	....	....	....	1	....	6	2	7	22	1	38	....
South Dakota	....	....	....	....	....	....	....	23	32	17	20	30	122	28
Tennessee	1	1	....	....	....	2	....	40	17	26	40	18	141	21
Utah	5	2	1	1	1	10	2	496	525	205	276	110	1,612	315
Vermont	....	....	....	....	....	....	....	13	22	1	15	3	54	58
Virginia	....	1	....	....	....	1	....	16	30	38	16	4	104	....
Washington	....	....	....	....	....	....	....	8	26	2	5	1	42	5
Wisconsin	3	1	....	....	....	4	....	150	55	40	54	2	301	7
Other states	1	1	....	1	....	3	....	51	85	61	285	139	671	201
Total	**47**	**35**	**25**	**21**	**4**	**132**	**12**	**2,952**	**3,142**	**2,057**	**2,624**	**1,214**	**11,989**	**1,984**

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TABLE 9.—***Smelting plants:*** *Fatalities and injuries, by causes and States, 1917 to 1922.*

	Killed.							Injured.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
ACCIDENTS BY CAUSES.														
16. Haulage system (cars, motors, etc.)	7	8	6	4	2	27	2	693	559	350	238	121	1,961	206
17. Railway cars and locomotives	4	5	....	....	....	9	1	113	87	46	72	28	346	53
18. Cranes	3	2	6	....	....	11	....	146	97	60	51	32	386	40
19. Other machinery	9	13	4	5	2	33	1	375	377	217	185	96	1,250	121
20. Falls of persons	8	4	4	3	2	21	5	564	496	330	295	146	1,831	227
21. Suffocation in ore bins	1	....	1	....	2	4	....	73	5	2	4	.....	84	2
22. Flying or falling objects (rocks, timbers, etc.)	2	....	2	3	1	8	1	1,107	1,050	734	609	287	3,787	459
23. Gas (burns or asphyxiation)	....	....	1	....	....	1	1	48	136	60	40	15	299	38
24. Scalding (steam or water)	2	....	....	1	1	4	1	76	68	30	47	20	250	20
25. Electricity	9	3	2	1	....	15	1	37	41	31	23	6	138	13
26. Hand tools, axes, bars, etc	....	....	....	....	....	....	....	736	562	337	414	179	2,228	263
27. Nails, splinters, etc	....	....	....	....	....	....	....	208	103	70	87	51	579	56
28. Burns from matte, slag, or molten metal (pouring or spilling)	2	4	2	....	1	9	2	1,488	1,290	959	897	401	5,035	568
29. Hot-metal explosions	2	2	2	1	....	7	....	242	255	95	62	55	709	62
30. Other causes	4	1	4	2	3	14	1	1,839	1,557	1,101	1,123	692	6,312	874
Total	53	42	34	20	14	163	16	7,745	6,743	4,431	4,147	2,129	25,195	3,002
ACCIDENTS BY STATES.														
Arizona	10	9	5	3	2	29	1	1,184	1,412	716	687	152	4,151	351
Arkansas	....	2	....	1	....	3	....	83	53	65	84	39	324	.....
California	5	....	1	....	....	6	....	188	289	122	37	33	669	44
Colorado	1	5	1	2	1	10	1	331	269	172	165	33	970	74
Illinois	3	3	....	3	....	9	2	749	630	408	433	177	2,403	171
Michigan	....	....	1	....	....	1	1	164	104	52	107	72	499	103
Montana	....	2	7	2	2	13	3	238	248	141	151	52	830	97
Nevada	3	2	1	....	....	6	1	132	117	28	132	30	439	74
New Jersey	5	4	4	....	1	14	4	677	682	414	377	197	2,347	263
Oklahoma	4	4	....	....	....	8	1	895	479	544	265	107	2,290	218
Pennsylvania	3	2	....	....	....	5	....	608	396	382	374	398	2,158	480
Texas	....	1	....	....	....	1	....	164	178	99	39	18	498	36
Utah	9	4	4	3	2	22	....	556	383	265	163	110	1,477	171
West Virginia	1	....	....	....	2	3	1	182	107	83	91	91	554	123
Other States	9	4	10	6	4	33	1	1,594	1,390	940	1,042	620	5,686	797
Total	53	42	34	20	14	163	16	7,745	6,743	4,431	4,147	2,129	25,195	3,002

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TABLE 10.—*Metallurgical plants: Men employed, by States, 1917 to 1922.*

ACTUAL NUMBER EMPLOYED.

State.	Ore-dressing plants.							Smelting plants.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Alabama	193	315	203	194	45	950	48							
Alaska	467	336	375	459	580	2,217	269							
Arizona	2,630	3,319	2,149	1,812	773	10,683	1,052	4,398	4,477	1,678	2,593	1,628	14,774	1,755
Arkansas								530	465	712	440	270	2,417	
California	755	1,229	633	508	378	3,503	428	590	639	464	333	313	2,339	361
Colorado	1,715	1,885	1,347	1,027	670	6,644	642	2,864	2,671	1,438	1,371	513	8,857	784
Idaho	642	452	494	512	367	2,467	419							
Illinois	156	151	120	121	80	628	86	3,731	3,711	2,582	2,433	950	13,407	1,311
Kansas	206	147	194	209	137	893	257							
Michigan	2,426	1,948	1,795	1,418	918	8,505	983	1,197	994	764	585	468	4,008	496
Minnesota	337	561	522	556	276	2,252	244							
Missouri	1,523	1,074	878	795	628	4,898	578							
Montana	2,051	2,360	1,096	1,122	509	7,138	1,043	2,399	2,452	1,350	1,214	648	8,063	1,382
Nevada	1,565	1,450	903	889	494	5,301	673	1,143	1,297	836	672	213	4,161	415
New Jersey	537	671	605	511	441	2,765	428	4,313	4,133	3,002	2,650	1,742	15,840	2,192
New Mexico	891	773	587	558	267	3,076	367							
New York	565	435	793	911	619	3,323	864							
Oklahoma	452	471	1,071	1,034	353	3,381	663	5,063	3,064	2,161	1,859	985	13,132	1,459
Oregon	97	67	95	48	28	335								
Pennsylvania								3,700	3,803	3,138	2,955	1,659	15,255	2,157
South Dakota	250	304	288	248	241	1,331	229							
Tennessee	425	266	206	366	197	1,460	172							
Texas								1,100	1,116	492	674	474	3,856	452
Utah	4,103	1,942	1,382	1,064	738	9,229	814	2,658	3,173	1,832	1,775	1,272	10,710	1,714
Vermont	215	193	66	134	48	656	79							
Virginia	709	550	648	599	112	2,618								
Washington	63	147	79	177	26	492	63							
West Virginia								1,090	712	610	640	358	3,410	535
Wisconsin	247	195	219	166	69	896	59							
Other States	891	568	514	1,389	1,053	4,415	1,216	9,600	7,192	7,718	5,905	3,128	33,543	4,482
Total	24,111	21,809	17,262	16,827	10,047	90,056	11,676	44,376	39,899	28,777	26,099	14,621	153,772	19,495

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TABLE 11.—***Metallurgical plants:*** *Full-time, or 300-day workers, by States, 1917 to 1922.*

EQUIVALENT IN 300-DAY WORKERS (CALCULATED).

State.	Ore-dressing plants.							Smelting plants.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Alabama	149	191	101	127	12	580	27	.....	.....	.....	.....	.....	.....	.....
Alaska	467	373	445	557	586	2,428	312	.....	.....	.....	.....	.....	16,137	1,603
Arizona	2,679	3,730	2,420	2,083	524	11,436	1,125	5,068	5,425	1,869	3,158	617	2,048	.....
Arkansas	.....	.....	.....	.....	.....	.....	.....	609	543	813	490	193	2,552	381
California	906	1,475	518	454	345	3,698	462	708	766	384	364	330	9,325	798
Colorado	1,715	1,885	1,207	1,060	634	6,501	628	2,864	2,671	1,749	1,517	524	.....	.....
Idaho	597	451	406	536	317	2,307	361	.....	.....	.....	.....	.....	15,610	1,491
Illinois	143	153	111	107	67	581	68	4,398	4,471	2,775	2,939	1,027	.....	.....
Kansas	107	103	109	158	121	658	219	.....	.....	.....	.....	.....	.....	.....
Michigan	2,510	1,987	1,879	1,428	749	8,553	849	1,238	1,023	862	589	277	3,989	425
Minnesota	260	315	277	292	139	1,292	168	.....	.....	.....	.....	.....	.....	.....
Missouri	1,307	981	740	841	620	4,489	583	.....	.....	.....	.....	.....	.....	.....
Montana	2,019	2,190	1,197	1,241	328	7,275	1,130	2,507	2,550	1,558	1,418	554	8,587	1,601
Nevada	1,621	1,739	1,084	997	407	5,848	626	1,378	1,557	1,005	780	104	4,824	335
New Jersey	551	679	597	511	370	2,708	414	5,123	5,613	2,746	3,193	2,119	18,194	2,540
New Mexico	969	841	617	519	99	3,045	298	.....	.....	.....	.....	.....	.....	.....
New York	522	357	749	886	566	3,020	758	.....	.....	.....	.....	.....	.....	.....
Oklahoma	346	385	959	984	192	2,866	590	6,093	3,315	2,451	1,918	785	14,562	1,363
Oregon	79	70	66	48	4	267	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	.....	.....	.....	.....	.....	.....	.....	4,442	4,609	3,606	3,562	1,946	18,165	2,592
South Dakota	292	321	307	300	291	1,511	276	.....	.....	.....	.....	.....	.....	.....
Tennessee	382	222	165	365	111	1,245	127	.....	.....	.....	.....	.....	.....	.....
Texas	.....	.....	.....	.....	.....	.....	.....	1,336	1,352	583	818	563	4,652	548
Utah	4,865	2,304	1,613	1,216	612	10,610	745	3,176	3,861	2,225	2,137	1,369	12,768	1,948
Vermont	194	191	55	132	37	609	76	.....	.....	.....	.....	.....	.....	.....
Virginia	690	518	529	522	57	2,316	.....	.....	.....	.....	.....	.....	.....	.....
Washington	39	126	64	115	13	357	70	.....	.....	.....	.....	.....	.....	.....
West Virginia	.....	.....	.....	.....	.....	.....	.....	1,269	845	631	669	384	3,798	651
Wisconsin	213	196	194	151	30	784	59	.....	.....	.....	.....	.....	.....	.....
Other States	741	434	393	1,183	866	3,617	1,081	10,450	7,438	8,067	6,859	3,412	36,226	4,611
Total	**24,372**	**22,517**	**16,862**	**16,813**	**8,037**	**88,601**	**11,052**	**50,659**	**45,439**	**31,324**	**30,411**	**14,204**	**172,037**	**20,887**

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TABLE 12.—***Metallurgical plants:*** *Days of labor performed, by States, 1917 to 1922.*

DAYS OF LABOR PERFORMED.

State.	Ore-dressing plants.							Smelting plants.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Alabama	44,715	57,429	30,286	38,216	3,594	174,240	8,190	.....	.....	.....	.....	.....	.....	.....
Alaska	139,960	111,890	133,614	167,076	175,810	728,350	93,509	.....	.....	.....	.....	.....	.....	.....
Arizona	803,567	1,119,017	725,921	624,922	157,086	3,430,513	337,363	1,520,283	1,627,441	560,707	947,232	185,256	4,840,919	480,757
Arkansas	.....	.....	.....	.....	.....	.....	.....	182,575	162,975	243,925	147,070	58,040	794,585	.....
California	271,800	442,391	155,511	136,219	103,516	1,109,437	138,687	212,400	229,886	115,133	109,314	98,930	765,663	114,399
Colorado	514,500	505,648	362,217	317,982	190,125	1,950,472	188,418	859,200	801,270	524,870	455,156	157,375	2,797,871	239,456
Idaho	179,238	135,221	121,734	140,159	95,088	691,940	108,151	.....	.....	.....	.....	.....	.....	.....
Illinois	43,008	45,840	33,410	32,089	20,066	174,413	20,493	1,319,525	1,341,285	832,610	881,709	307,960	4,683,149	447,263
Kansas	32,190	31,065	50,629	47,438	36,208	197,470	45,770	.....	.....	.....	.....	.....	.....	.....
Michigan	752,874	596,080	563,752	428,298	224,616	2,565,626	254,585	371,479	306,790	258,605	176,680	83,110	1,196,664	127,618
Minnesota	80,703	94,522	83,016	87,637	41,623	387,501	50,530	.....	.....	.....	.....	.....	.....	.....
Missouri	392,225	284,256	221,938	252,183	185,891	1,336,493	174,735	.....	.....	.....	.....	.....	.....	.....
Montana	605,705	747,109	359,015	372,350	98,417	2,182,653	338,894	752,157	765,125	467,229	425,459	166,364	2,576,334	480,392
Nevada	486,255	521,580	325,020	298,930	122,258	1,754,043	187,738	413,423	467,130	301,590	234,083	31,098	1,447,324	100,525
New Jersey	165,308	203,831	179,106	153,150	111,028	812,483	124,251	1,536,773	1,503,858	823,602	957,916	635,830	5,458,039	762,080
New Mexico	200,836	252,373	185,184	135,812	29,057	913,872	89,537	.....	.....	.....	.....	.....	.....	.....
New York	156,601	107,088	224,526	265,708	151,797	905,720	227,237	.....	.....	.....	.....	.....	.....	.....
Oklahoma	103,933	115,516	287,583	295,198	57,752	859,983	176,940	1,827,884	994,487	735,200	575,247	235,383	4,368,201	408,810
Oregon	23,637	20,854	19,798	14,530	1,278	80,097	.....	.....	.....	.....	.....	.....	.....	.....
Pennsylvania	.....	.....	.....	.....	.....	.....	.....	1,332,500	1,382,795	1,081,704	1,068,518	583,709	5,449,226	777,465
South Dakota	87,475	96,189	92,227	90,033	87,413	453,337	82,791	.....	.....	.....	.....	.....	.....	.....
Tennessee	114,513	66,536	49,565	109,362	33,285	373,261	38,188	.....	.....	.....	.....	.....	.....	.....
Texas	.....	.....	.....	.....	.....	.....	.....	400,962	405,521	174,764	245,398	168,852	1,395,497	164,469
Utah	1,459,383	691,255	483,852	364,089	183,705	3,182,884	223,604	952,918	1,158,145	667,450	640,957	410,655	3,830,125	584,510
Vermont	58,308	37,419	16,420	30,609	11,189	182,945	22,800	.....	.....	.....	.....	.....	.....	.....
Virginia	206,921	155,436	158,840	156,637	16,982	694,822	.....	.....	.....	.....	.....	.....	.....	.....
Washington	11,800	37,775	19,302	34,424	4,065	107,366	21,099	.....	.....	.....	.....	.....	.....	.....
West Virginia	.....	.....	.....	.....	.....	.....	.....	380,578	253,608	189,270	200,570	115,145	1,139,171	195,275
Wisconsin	64,011	58,667	58,116	46,160	8,981	235,935	17,755	.....	.....	.....	.....	.....	.....	.....
Other States	222,023	129,966	117,890	354,580	259,688	1,084,153	324,237	3,131,986	2,231,285	2,420,303	2,057,817	1,023,597	10,868,048	1,383,140
Total	7,311,499	6,754,962	5,058,545	5,043,911	2,411,148	26,580,055	3,315,471	15,197,643	13,631,601	9,397,082	9,123,186	4,261,304	51,610,816	6,266,159

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TABLE 13.—***Metallurgical plants**: Average number of days plants were operated, by States, 1917 to 1922.*

AVERAGE DAYS ACTIVE.

State.	Ore-dressing plants.							Smelting plants.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Alabama	232	182	149	197	80	183	171							
Alaska	300	333	356	364	303	329	348							
Arizona	306	337	338	345	203	321	321	346	364	334	365	114	328	274
Arkansas								344	350	343	334	215	329	
California	360	360	246	268	274	317	324	360	360	248	328	316	327	317
Colorado	300	300	260	310	284	294	293	300	300	365	332	307	316	305
Idaho	270	290	246	314	270	280	258							
Illinois	276	304	278	265	251	278	238	354	361	322	362	324	349	341
Kansas	156	211	261	227	264	221	256							
Michigan	310	306	314	302	245	302	259	310	309	338	302	178	299	257
Minnesota	239	168	150	158	151	172	207							
Missouri	258	271	253	317	296	275	302							
Montana	295	317	327	332	193	306	325	314	312	346	350	257	320	348
Nevada	311	360	360	336	247	331	279	362	360	361	348	146	348	242
New Jersey	308	304	296	300	252	294	290	356	364	274	361	365	345	348
New Mexico	326	326	315	265	111	247	244							
New York	277	246	283	292	245	273	263							
Oklahoma	230	245	260	285	164	254	267	361	325	340	309	239	336	280
Oregon	244	311	208	303	46	239								
Pennsylvania	215	228	258	336				360	364	345	362	352	357	360
South Dakota	350	316	320	363	363	341	362							
Tennessee	269	250	241	299	169	256	222							
Texas							315	365	363	355	364	364	362	364
Utah	356	356	350	343	249	345	275	359	365	364	361	323	358	341
Vermont	271	298	249	296	233	279	289							
Virginia	292	283	245	261	152	265	335							
Washington	187	257	244	194	156	218								
West Virginia							301	349	356	310	313	321	334	365
Wisconsin	259	301	265	278	130	263	261							
Other States	249	229	229	248	247	215		327	310	314	348	327	324	309
Total	**303**	**310**	**293**	**300**	**240**	**295**	**284**	**342**	**342**	**327**	**350**	**293**	**336**	**321**

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TABLE 14.—*Metallurgical plants: Number killed and injured per 1,000 300-day workers employed, by causes, 1917 to 1922.*

Cause of accident.	Number killed per 1,000 300-day workers.							Number injured per 1,000 300-day workers.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Ore-dressing plants:														
1. Haulage (cars, motors, etc.)	0.28	0.18	.....	0.06	0.12	0.15	.....	5.54	4.75	6.60	7.55	6.59	6.02	10.50
2. Railway cars and locomotives	.17	.04	0.12	.....	.....	.08	.....	1.19	3.02	2.85	1.43	2.12	2.10	4.89
3. Crushers, rolls, or stamps	.12	.....	.06	.12	.12	.08	.....	4.60	4.93	6.42	6.07	8.71	5.68	8.14
4. Tables, jigs, etc	.08	.....	.06	.....	.....	.03	0.09	2.50	4.08	3.51	2.50	2.12	3.06	5.70
5. Other machinery	.37	.62	.36	.48	.25	.44	.46	11.57	16.34	16.87	17.13	16.17	15.26	20.18
6. Falls of persons	.37	.26	.24	.12	.....	.24	.09	16.37	18.39	11.94	19.21	16.42	16.58	17.82
7. Suffocation in ore bins	.12	.09	.24	.24	.....	.15	.18	.25	.49	.30	.24	.62	.35	.45
8. Falling objects (rocks, timbers, etc.)	.17	.....	.06	.....	.....	.06	.....	15.22	17.28	11.87	16.83	12.32	15.15	19.54
9. Cyanide or other poisoning	.....	.04	.06	.....	.....	.02	.09	.98	2.00	.65	.95	.50	1.13	.36
10. Scalding steam or water	.04	.....	.06	.....	.....	.02	.09	.74	.67	2.02	1.31	2.74	1.25	2.44
11. Electricity	.17	.15	.12	.12	.....	.12	.09	1.64	2.80	1.37	2.14	2.99	2.10	3.35
12. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	10.22	13.23	9.92	15.52	13.44	12.22	15.11
13. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	7.92	7.33	5.76	7.14	7.96	7.21	9.50
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	.....	.....	.....	12.39	8.79	8.32	10.65	9.08	10.07	14.75
15. Other causes	.04	.17	.12	.12	.....	.10	.....	29.99	35.44	33.81	47.40	49.27	37.14	46.78
Total	**1.93**	**1.55**	**1.48**	**1.25**	**.50**	**1.49**	**1.09**	**121.12**	**139.54**	**122.21**	**156.07**	**151.05**	**135.32**	**179.51**
Smelting plants:														
16. Haulage system (cars, motors, etc.)	.14	.18	.20	.13	.14	.16	.09	13.68	12.30	11.17	7.83	8.52	11.40	9.86
17. Railway cars and locomotives	.08	.11	.....	.....	.....	.05	.05	2.23	1.91	1.47	2.37	1.97	2.01	2.54
18. Cranes	.06	.04	.20	.....	.....	.07	.....	2.88	2.13	1.92	1.68	2.25	2.24	1.92
19. Other machinery	.18	.29	.13	.17	.14	.19	.05	7.40	8.30	6.93	6.08	6.76	7.27	5.79
20. Falls of persons	.15	.09	.13	.10	.14	.12	.24	11.13	10.92	10.54	9.70	10.28	10.64	10.87
21. Suffocation in ore bins	.02	.....	.03	.....	.14	.02	.....	1.44	.11	.06	.13	.....	.49	.10
22. Flying or falling objects (rocks, timbers, etc.)	.04	.....	.06	.10	.07	.05	.05	21.85	23.11	23.43	20.03	20.21	22.01	21.98
23. Gas (burns or asphyxiation)	.....	.....	.03	.....	.....	.01	.05	.95	2.99	1.92	1.31	1.06	1.74	1.82
24. Scalding (steam or water)	.04	.....	.....	.03	.07	.02	.05	1.50	1.50	1.25	1.54	1.41	1.45	.96
25. Electricity	.18	.06	.06	.03	.....	.09	.05	.73	.90	.99	.76	.42	.80	.62
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	14.53	12.37	10.76	13.61	12.60	12.95	12.59
27. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	4.11	3.59	2.23	2.86	3.59	3.37	2.68
28. Burns from matte, slag, or molten metal (pouring or spilling)	.04	.09	.06	.....	.07	.05	.09	29.37	28.39	30.61	29.50	28.23	29.27	27.19
29. Hot-metal explosions	.04	.04	.06	.03	.....	.04	.....	4.78	5.61	3.03	2.04	3.87	4.12	2.97
30. Other causes	.08	.02	.13	.07	.22	.08	.05	36.30	34.27	35.15	36.93	48.72	36.69	41.84
Total	**1.05**	**.92**	**1.09**	**.66**	**.99**	**.95**	**.77**	**152.88**	**148.40**	**141.46**	**136.37**	**149.89**	**146.45**	**143.73**

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TABLE 15.—***Metallurgical plants:*** *Percentage of fatalities and injuries, by causes, 1917 to 1922.*

Cause of accident.	Killed.							Injured.						
	1917	1918	1919	1920	1921	Total.	1922	1917	1918	1919	1920	1921	Total.	1922
Ore-dressing plants:														
1. Haulage (cars and motors)	14.89	11.43	.....	4.76	25.00	9.85	.....	4.57	3.41	5.40	4.84	4.37	4.45	5.85
2. Railway cars or locomotives	8.51	2.86	8.00	.....	.....	5.30	.....	.98	2.17	2.33	.91	1.40	1.55	2.72
3. Crushers, rolls, or stamps	6.38	.....	4.00	9.52	25.00	5.30	.....	3.80	3.53	5.25	3.89	5.77	4.20	4.54
4. Tables, jigs, etc	4.26	.....	4.00	.....	.....	2.27	8.33	2.07	2.93	2.87	1.60	1.40	2.26	3.17
5. Other machinery	19.15	40.00	24.00	38.10	50.00	29.54	41.67	9.55	11.71	13.81	10.98	10.71	11.28	11.24
6. Falls of persons	19.15	17.14	16.00	9.52	.....	15.91	8.33	13.52	13.18	9.77	12.31	10.87	12.25	9.93
7. Suffocation in ore bins	6.38	5.71	16.00	19.05	.....	9.85	.....	.20	.36	.24	.15	.41	.26	.25
8. Falling objects (rocks, timber, etc.)	8.51	.....	4.00	.....	.....	3.79	16.67	12.57	12.38	9.72	10.79	8.15	11.19	10.89
9. Cyanide or other poisoning	.....	2.86	4.00	.....	.....	1.52	8.33	.81	1.43	.53	.61	.33	.83	.20
10. Scalding (steam or water)	2.13	.....	4.00	.....	.....	1.52	8.33	.61	.45	1.65	.84	1.81	.93	1.36
11. Electricity	8.51	8.57	8.00	9.52	.....	8.33	8.33	1.36	2.01	1.12	1.37	1.98	1.55	1.86
12. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	8.43	9.49	8.12	9.95	8.90	9.03	8.42
13. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	6.54	5.25	4.72	4.57	5.27	5.33	5.29
14. Flying pieces of rock from sledging or crushing	.....	.....	.....	.....	.....	.....	.....	10.23	6.30	6.81	6.82	6.01	7.44	8.22
15. Other causes	2.13	11.43	8.00	9.52	.....	6.82	.....	24.76	25.40	27.66	30.37	32.62	27.45	26.06
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Smelting plants:														
16. Haulage (cars, motors, etc.)	13.21	19.05	17.65	20.00	14.29	16.57	12.50	8.95	8.29	7.90	5.74	5.68	7.78	6.86
17. Railway cars or locomotives	7.55	11.91	.....	.....	.....	5.52	6.25	1.46	1.29	1.04	1.74	1.32	1.37	1.76
18. Cranes	5.66	4.76	17.65	.....	.....	6.75	.....	1.89	1.44	1.35	1.23	1.50	1.53	1.33
19. Other machinery	16.98	30.96	11.77	25.00	14.29	20.25	6.25	4.84	5.59	4.90	4.46	4.51	4.96	4.03
20. Falls of persons	15.10	9.52	11.77	15.00	14.29	12.88	31.25	7.28	7.36	7.45	7.11	6.86	7.27	7.56
21. Suffocation in ore bins	1.89	.....	2.94	.....	14.29	2.45	.....	.94	.07	.04	.10	.....	.33	.07
22. Flying or falling objects (rocks, timbers, etc.)	3.77	.....	5.88	15.00	7.14	4.91	6.25	14.29	15.57	16.57	14.69	13.48	15.03	15.29
23. Gas (burns or asphyxiation)	.....	.....	2.94	.....	.....	.61	6.25	.62	2.02	1.35	.96	.70	1.19	1.27
24. Scalding (steam or water)	3.77	.....	.....	5.00	7.14	2.45	6.25	.98	1.01	.88	1.13	.94	.99	.67
25. Electricity	16.98	7.14	5.88	5.00	.....	9.20	6.25	.48	.61	.70	.55	.28	.55	.43
26. Hand tools, axes, bars, etc	.....	.....	.....	.....	.....	.....	.....	9.50	8.33	7.61	9.98	8.41	8.84	8.76
27. Nails, splinters, etc	.....	.....	.....	.....	.....	.....	.....	2.69	2.42	1.58	2.10	2.40	2.30	1.87
28. Burns from matte, slag, or molten metal (pouring or spilling)	3.77	9.52	5.88	.....	7.14	5.52	12.50	19.21	19.13	21.64	21.63	18.84	19.99	18.92
29. Hot-metal explosions	3.77	4.76	5.88	5.00	.....	4.30	.....	3.12	3.78	2.14	1.50	2.58	2.82	2.07
30. Other causes	7.55	2.38	11.77	10.00	21.42	8.59	6.25	23.75	23.09	24.85	27.08	32.50	25.05	29.11
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

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TABLE 16.—*Metallurgical-plant accidents, 1919–1922.*

Cause.	Killed.	Permanent disability.		Temporary disability.[3]	Slight.[4]	Total columns 4 and 5.	Total columns 2–5.	Total fatal and nonfatal.
		Total.[1]	Partial.[2]					
	1	2	3	4	5	6	7	8
Ore-dressing plants:								
1. Haulage system (cars, motors, etc.)	2	.....	2	133	272	405	407	409
2. Railway cars and locomotives	2	.....	3	33	107	140	143	145
3. Crushers, rolls, or stamps	4	.....	11	111	248	359	370	374
4. Tables, jigs, etc	2	1	2	41	137	178	181	183
5. Other machinery	21	.....	30	236	659	895	925	946
6. Falls of persons	7	.....	5	261	587	848	853	860
7. Suffocation in ore bins	10	.....	.....	1	18	19	19	29
8. Falling objects (rocks, timbers, etc.)	1	1	7	166	624	790	798	799
9. Cyanide or other poisoning	2	.....	.....	13	22	35	35	37
10. Scalding (steam or water)	2	.....	1	25	79	104	105	107
11. Electricity	5	.....	2	30	88	118	120	125
12. Hand tools, axes, bars, etc	.....	.....	9	107	587	694	703	703
13. Nails, splinters, etc	.....	.....	4	33	349	382	386	386
14. Flying pieces of rock from sledging or crushing	.....	.....	11	53	491	544	555	555
15. Other causes	4	1	11	436	1,831	2,267	2,279	2,283
Total	**62**	**3**	**98**	**1,679**	**6,099**	**7,778**	**7,879**	**7,941**
Smelting plants:								
16. Haulage system (cars, motors, etc.)	14	1	16	339	559	898	915	929
17. Railway cars and locomotives	1	.....	2	86	111	197	199	200
18. Cranes	6	.....	7	74	102	176	183	189
19. Other machinery	12	.....	29	165	425	590	619	631
20. Falls of persons	14	.....	12	324	662	986	998	1,012
21. Suffocation in ore bins	3	.....	.....	2	6	8	8	11
22. Flying or falling objects (rocks, timbers, etc.)	7	.....	15	493	1,581	2,074	2,089	2,096
23. Gas (burns or asphyxiation)	2	.....	.....	42	111	153	153	155
24. Scalding (steam or water)	3	.....	1	50	75	125	126	129
25. Electricity	4	.....	4	18	51	69	73	77
26. Hand tools, axes, bars, etc	.....	1	11	255	926	1,181	1,193	1,193
27. Nails, splinters, etc	.....	.....	3	38	223	261	264	264
28. Burns from matte, slag, or molten metal (pouring or spilling)	5	.....	41	666	2,118	2,784	2,825	2,830
29. Hot-metal explosions	3	.....	8	89	177	266	274	277
30. Other causes	10	.....	20	777	2,993	3,770	3,790	3,800
Total	**84**	**2**	**169**	**3,418**	**10,120**	**13,538**	**13,709**	**13,793**
Auxiliary works:								
31. Haulage system (cars, motors, etc.)	10	.....	5	85	198	283	288	298
32. Railway cars and locomotives	9	1	2	49	99	148	151	160
33. Falls of persons	5	.....	3	210	441	651	654	659
34. Falling objects (rocks, timbers, etc.)	4	.....	7	250	867	1,117	1,124	1,128
35. Nails, splinters, etc	.....	.....	2	40	321	361	363	363
36. Hand tools, axes, bars, etc	.....	.....	11	141	628	769	780	780
37. Electricity	6	.....	2	23	51	74	76	82
38. Machinery	4	.....	13	142	379	521	534	538
39. Failure of ladders, scaffold, or other support	5	.....	3	29	50	79	82	87
40. Handling hot materials	1	.....	3	48	169	217	220	221
41. Other causes	7	.....	14	395	1,892	2,287	2,301	2,308
Total	**51**	**1**	**65**	**1,412**	**5,095**	**6,507**	**6,573**	**6,624**
Grand total	**197**	**6**	**332**	**6,509**	**21,314**	**27,823**	**28,161**	**28,358**

[1] *Permanent total disability.*—Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] *Permanent partial disability.*—Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Time lost, more than 14 days.
[4] Time lost, 1 to 14 days, inclusive.

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TABLE 17.—***Copper metallurgical plants:*** *Summary of labor and accidents at selected plants, 1918 to 1922.*

MILLS.

	1918	1919	1920	1921	1922
Number of plants	44	23	29	28	42
Men employed	8,222	4,711	5,218	2,286	3,888
Number of 300-day workers	9,037	5,452	5,957	1,450	3,847
Total days' labor (shifts)	2,711,186	1,635,520	1,787,219	435,069	1,154,186
Average days active	330	347	343	190	297
Number killed	13	8	2	.....	1
Number injured	1,521	691	885	251	666
Number killed per 1,000 300-day workers	1.44	1.47	.34	.....	.26
Number injured per 1,000 300-day workers	168.31	126.74	148.56	173.10	173.12

SMELTERS.

Number of plants	25	21	24	23	26
Men employed	12,363	9,294	8,388	5,339	7,163
Number of 300-day workers	14,038	9,675	8,816	4,490	7,497
Total days' labor (shifts)	4,211,381	2,902,514	2,644,834	1,346,976	2,248,960
Average days active	341	312	315	252	314
Number killed	13	17	5	8	8
Number injured	2,227	1,471	1,481	611	970
Number killed per 1,000 300-day workers	.93	1.76	.57	1.78	1.07
Number injured per 1,000 300-day workers	158.64	152.04	167.99	136.08	129.39

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TABLE 18.—*Copper metallurgical plants: Accidents, by causes, at selected plants, 1918 to 1922.*

Cause of accident.	Mills.												Smelters.											
	Killed.						Injured.						Killed.						Injured.					
	1918	1919	1920	1921	1922	Total.	1918	1919	1920	1921	1922	Total.	1918	1919	1920	1921	1922	Total.	1918	1919	1920	1921	1922	Total.
Haulage system (cars, motors, etc.)	2	....	1	....	....	3	41	27	43	8	53	172	2	4	1	....	....	7	147	115	121	32	74	489
Railway cars and locomotives	....	....	....	....	....	....	32	11	7	3	24	77	....	....	....	....	1	1	43	39	43	16	25	166
Crushers, rolls, or stamps	....	....	....	....	....	....	26	22	22	9	23	102	....	....	....	....	....	....	....	....	....	....	....	....
Tables, jigs, etc	....	1	....	....	....	1	44	18	16	3	12	93	....	....	....	....	....	....	....	....	....	....	....	....
Cranes	....	....	....	....	....	....	....	....	....	....	....	....	1	3	....	....	....	4	43	45	30	20	27	165
Other machinery	7	2	1	....	3	13	161	84	90	28	67	430	3	1	....	....	....	4	114	82	75	25	51	347
Falls of persons	1	1	....	....	....	2	230	88	125	37	87	567	1	....	2	2	4	9	178	152	132	60	90	612
Suffocation in ore bins	....	2	....	....	1	3	7	....	3	....	4	14	....	1	....	2	....	3	4	1	4	....	1	10
Falling objects (rocks, timbers, etc.)	....	....	....	....	....	....	208	67	85	27	88	475	....	1	....	1	....	2	402	263	258	127	180	1,230
Cyanide or other poisoning	....	....	....	....	....	....	31	2	....	....	....	33	....	....	....	....	....	....	....	....	....	....	....	....
Gas (burns or asphyxiation)	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	2	11	14	4	1	8	38
Scalding (steam or water)	....	1	....	....	1	2	6	9	10	2	13	40	....	....	....	1	....	1	15	18	15	4	5	57
Electricity	....	....	....	....	....	....	42	6	17	5	20	90	1	1	....	....	....	2	22	18	13	4	4	61
Hand tools, axes, bars, etc	....	....	....	....	....	....	175	67	103	24	74	443	....	....	....	....	....	....	237	120	151	55	89	652
Nails, splinters, etc	....	....	....	....	....	....	97	44	40	4	48	233	....	....	....	....	....	....	66	26	27	16	20	155
Flying pieces of rock from sledging or crushing	....	....	....	....	....	....	42	21	27	15	20	125	....	....	....	....	....	....	....	....	....	....	....	....
Burns from matte, slag, or molten metal	....	....	....	....	....	....	....	....	....	....	....	....	3	....	....	1	2	6	328	235	259	68	133	1,023
Hot-metal explosions	....	....	....	....	....	....	....	....	....	....	....	....	2	2	1	....	....	5	66	44	20	24	11	165
Other causes	3	1	....	....	....	4	379	225	297	86	133	1,120	....	3	1	1	....	5	551	299	329	159	252	1,590
Total	**13**	**8**	**2**	**0**	**5**	**28**	**1,521**	**691**	**885**	**251**	**666**	**4,014**	**13**	**17**	**5**	**8**	**8**	**51**	**2,227**	**1,471**	**1,481**	**611**	**970**	**6,760**

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TABLE 19.—*Metallurgical Plants: Labor and accident data for 1922, classified by length of shift.*[1]

MILLS.

Length of shift.	Men employed.		Days of labor performed.	Total hours.	Average days per man.	Average hours per man.	Killed.	Nonfatal injuries.				Total fatal and nonfatal.
	Actual number.	Equivalent in 300-day workers.						Permanent disability.		Temporary disability.	Slight.	Total nonfatal.
								Total.	Partial.			
8 hours	5,367	5,331	1,599,274	12,794,192	298	2,384	6	.....	5	164	513	682	688
9 hours	1,450	1,309	392,809	3,535,281	271	2,438	.....	.....	.....	45	93	138	138
10 hours	1,502	1,204	361,227	3,612,270	240	2,405	2	1	6	53	355	415	417
11 hours	47	47	14,275	157,025	304	3,341	.....	.....	.....	3	1	4	4
12 hours	129	86	25,871	310,452	201	2,407	.....	.....	.....	1	14	15	15
All other and not stated	2,484	2,299	689,819	.....	278	.....	4	.....	10	106	522	638	642
Total	**10,979**	.....	**3,083,275**	.....	**281**	.....	**12**	**1**	**21**	**372**	**1,498**	**1,892**	**1,904**

SMELTERS.

8 hours	13,148	13,925	4,177,466	33,419,728	313	2,542	12	1	35	543	1,526	2,105	2,117
9 hours	546	287	85,988	773,892	157	1,417	1	.....	1	34	42	77	78
10 hours	24	17	5,248	52,480	219	2,187	.....	.....	.....	.....	12	12	12
11 hours	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
12 hours	233	246	73,880	886,560	317	3,804	.....	.....	.....	3	35	38	38
All other and not stated	5,183	6,031	1,809,178	.....	349	.....	3	.....	6	201	519	726	729
Total	**19,134**	**20,506**	**6,151,760**	.....	**322**	.....	**16**	**1**	**42**	**781**	**2,134**	**2,958**	**2,974**

[1] Alaska and California not included.

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TABLE 20.—***Metallurgical plants: Fatalities and injuries per 1,000,000 hours of exposure, classified by length of shift,*** *during the year ended December 31, 1922.*

MILLS.

Character of disability.	8 hours.	9 hours.	10 hours.
Fatal	0.469	.....	.554
Permanent total disability	.....	.....	.277
Permanent partial disability	.391	.....	1.661
Other serious	12.818	12.729	14.672
Slight	40.096	26.306	98.276
Total injuries	53.305	39.035	114.886
Total fatalities and injuries	53.774	39.035	115.440

SMELTERS.

Fatal	.359	1.292	.....
Permanent total disability	.030	.....	.....
Permanent partial disability	1.047	1.292	.....
Other serious	16.248	43.934	.....
Slight	45.662	54.271	.....
Total injuries	62.987	99.497	.....
Total fatalities and injuries	63.346	100.789	.....

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TABLE 21.—***Metallurgical plants:*** *Accident data for 1922, based on size of plant.*[1]

MILLS.

Men employed.	Number of plants.	Men employed.		Days of labor performed.	Average days active.	Killed.	Injured.	Killed, per 1,000 300-day workers.	Injured, per 1,000 300-day workers.
		Actual number.	Equivalent in 300-day workers.						
1–9	119	560	370	110,918	198	.....	121	.....	327.03
10–14	50	568	459	137,790	243	2	144	4.36	313.73
15–24	46	819	690	207,054	253	1	176	1.45	255.07
25–49	50	1,702	1,497	449,118	264	.....	290	.....	193.72
50–99	35	2,261	2,166	649,878	287	3	290	1.39	133.89
100–199	15	2,102	2,122	636,507	303	6	561	2.83	264.37
200–299	6	1,498	1,549	464,555	310	.....	220	.....	142.03
300 and over	4	1,469	1,425	427,455	291	.....	90	.....	63.16
Total	**325**	**10,979**	**10,278**	**3,083,275**	**281**	**12**	**1,892**	**1.17**	**184.06**

SMELTERS.

1–24	21	215	143	42,759	199	.....	40	.....	279.72
25–49	8	288	319	95,805	333	.....	59	.....	184.95
50–99	16	1,128	1,037	311,195	276	3	236	2.89	227.56
100–199	21	3,145	3,080	923,873	294	3	595	.97	193.18
200–299	16	3,884	3,979	1,193,580	307	3	475	.75	119.38
300 and over	21	10,474	11,948	3,584,548	342	7	1,553	.59	129.98
Total	**103**	**19,134**	**20,506**	**6,151,760**	**322**	**16**	**2,958**	**7.80**	**144.25**

[1] Alaska and California not included.

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TABLE 22.—*United States: Number of men killed per 1,000 300-day workers employed in mineral industries.*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Coal mines	4.97	4.46	4.70	4.66	4.44	3.93	4.25	3.94	4.27	3.78	4.19	4.89
All metal mines	4.45	4.09	3.72	3.92	3.89	3.62	4.44	3.57	3.47	3.16	3.09	3.54
Copper mines	5.18	4.53	4.08	3.85	3.72	3.64	5.88	3.45	3.54	3.43	3.70	3.00
Gold and miscellaneons metal mines	4.28	4.32	3.83	4.06	4.79	4.05	4.03	4.27	4.41	4.20	3.29	5.35
Iron mines	4.64	3.96	3.29	3.78	2.88	3.41	3.54	3.45	3.09	2.34	3.04	3.00
Lead and zinc mines (Mississippi Valley)	4.03	4.28	3.90	4.32	5.37	3.14	4.09	3.58	4.13	3.27	2.58	2.64
Nonmetallic mineral mines	2.01	1.66	3.02	3.72	2.43	3.00	2.48	1.67	1.65	2.89	1.98	2.39
All quarries (including outside works)	2.23	2.27	2.10	2.64	1.80	2.26	1.83	2.11	1.93	2.31	2.00	1.92
Cement-rock quarries	3.96	3.48	2.99	3.95	1.60	2.38	2.99	2.14	2.66	2.75	1.91	2.27
Granite quarries	1.92	1.87	1.47	3.36	2.27	1.86	1.54	2.10	1.81	2.06	2.57	1.42
Limestone quarries	2.21	2.19	2.13	2.38	1.70	2.36	1.79	1.79	1.97	2.58	1.97	1.87
Marble quarries	.71	2.48	1.81	2.72	1.00	1.16	.57	2.14	.51	.92	1.49	.43
Sandstone and bluestone quarries	1.82	1.16	1.32	1.45	.93	1.28	.99	2.38	.76	.56	1.25	1.19
Slate quarries	2.60	2.62	3.05	2.99	2.02	2.62	1.31	3.16	1.78	1.49	1.40	3.15
Trap-rock quarries	1.77	3.08	2.40	2.49	3.46	4.45	2.61	4.47	2.56	2.61	2.88	3.36
All quarries (excluding outside works)					2.17	2.32	2.00	2.19	2.29	2.81	2.22	2.31
All quarries (outside works only)					1.05	2.15	1.53	1.98	1.34	1.59	1.68	1.38
Metallurgical plants:												
Ore-dressing plants			.99	1.51	1.57	1.41	1.93	1.55	1.48	1.25	.50	1.09
Smelters			1.93	1.02	1.05	.73	1.05	.92	1.09	.66	.99	.77
Auxiliary works						.89	.94	.85	.31	1.08	1.08	1.21
All coke ovens			1.97	2.12	1.21	1.32	2.14	2.06	1.92	1.64	1.23	1.59
Beehive coke ovens					.65	1.29	1.30	1.16	.92	1.09	1.76	1.66
By-product coke ovens					1.75	1.35	3.13	2.84	2.55	1.92	1.09	1.57

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TABLE 23.—*United States: Number of men injured per 1,000 300-day workers employed in mineral industries.*

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Coal mines												
All metal mines	170.27	190.11	179.59	211.87	248.56	250.64	240.97	237.09	233.60	242.02	249.68	268.48
Copper mines	225.25	258.42	230.80	312.19	322.01	319.58	313.35	322.12	309.60	323.20	317.53	320.78
Gold and miscellaneous metal mines	80.33	93.04	70.37	126.90	201.49	190.79	172.51	185.18	191.29	204.82	225.46	260.29
Iron mines	252.30	241.81	268.31	224.07	233.51	240.17	227.54	185.45	202.35	200.49	210.91	177.44
Lead and zinc mines (Mississippi Valley)	139.40	158.29	133.51	189.01	238.27	263.09	272.99	319.54	292.28	327.97	379.67	464.23
Nonmetallic mineral mines	34.03	66.40	84.86	99.75	107.78	144.70	123.58	104.69	139.27	161.88	215.47	247.51
All quarries (including outside works)	63.85	69.82	88.81	114.92	117.30	175.62	185.14	147.07	144.20	145.51	174.54	171.93
Cement-rock quarries	136.52	139.59	207.99	226.20	148.25	248.83	277.73	238.65	231.58	182.49	213.50	191.08
Granite quarries	53.07	44.87	69.60	109.21	96.72	143.99	189.73	109.68	124.70	130.53	134.09	147.21
Limestone quarries	67.99	79.98	89.05	114.23	127.43	176.10	175.52	141.34	134.05	143.11	178.54	177.72
Marble quarries	43.39	42.35	68.67	121.31	93.80	125.20	100.20	58.02	75.26	91.98	100.87	127.76
Sandstone and bluestone quarries	34.68	45.26	74.36	69.08	66.56	127.86	118.89	148.04	131.96	100.56	156.22	100.63
Slate quarries	17.72	15.01	18.81	28.61	33.08	85.00	112.04	96.29	98.51	108.20	135.18	127.40
Trap-rock quarries	69.76	68.89	87.77	152.56	232.85	237.84	222.92	205.17	186.47	208.89	229.92	258.01
All quarries (excluding outside works)					127.57	158.63	162.95	148.29	146.65	139.62	167.09	177.16
All quarries (outside works only)					96.90	206.06	223.81	145.03	140.28	154.04	185.79	164.76
Metallurgical plants:												
Ore-dressing plants			122.38	94.19	109.65	135.66	121.12	139.54	122.21	156.07	151.05	179 51
Smelters			174.71	175.44	157.69	195.61	152.88	148.40	141.46	136.37	149.89	143.71
Auxiliary works						142.10	169.33	139.63	101.29	113.92	138.54	120.26
All coke ovens			107.73	103.06	90.78	153.49	188.59	219.64	145.66	114.13	133.62	93.77
Beehive coke ovens					39.84	100.37	94.43	131.11	125.96	102.54	118.52	98.28
By-product coke ovens					140.00	217.09	300.06	296.06	158.33	120.04	137.50	92.15

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